# THE GOVERNOR'S REPORT

## The Potential for

# DROUGHT IN MONTANA

**April 2006**

The Honorable Governor Brian Schweitzer

Prepared by

The Montana Drought Advisory Committee

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## INTRODUCTION

Water supply and moisture condition experts on the Governor's Drought Advisory Committee are confirming that Montana seems to be emerging from seven consecutive years of drought. It now appears that 2005 marked the transition from what was truly the longest and most severe episode of drought for Montana since the 1930s. An average to above average mountain snowpack this season translates to the best water supply outlook since 1997.

Generous amounts of precipitation have been received at valley locations almost everywhere across the state and forecasts are favorable for the trend to continue in the near term. Spring and summer streamflow forecasts, reservoir inflows, forest fuel moisture, and groundwater recharge are all on positive trend lines for now, provided the state receives average or better rain in coming months. Montanans are finally breathing a sigh of relief as soil moisture continues to improve across the state's vast rangelands and dryland farming country.

However, full recovery from the drought ushered in with the new millennium is unrealistic for many for months to come. In fact, the damage from the drought was irreversible for some, having been forced to liquidate generations-old family concerns. Unmeasured is the toll the drought has exacted from many Montanans in terms of stress, anguish, and economic failure. The drought brought severe hardship to outlying communities where agriculture is the mainstay, as well as Montana's large cities and towns, where the economic ripple effect made its way from large service businesses right down to small retail concerns. In contrast to isolated drought years of the recent past, the period of 1999 to 2005 brought the increasing burden of cumulative impacts that many sadly discovered had unrelenting exponential, not arithmetic effects on crop production, groundwater, fisheries, rangeland and pasture conditions, reservoirs, and balance sheets.

The state's Congressional delegation worked hard over the course of the drought to ensure that Montana producers had timely access to USDA and other emergency assistance programs. And the Governor's Drought Advisory Committee successfully coordinated assistance efforts with the delegation and with the state offices of USDA's Farm Service Agency and the Natural Resources Conservation Service (NRCS). But most of the credit goes to Montanans, who like generations past, pulled together to endure hardships that presented threats to their very way of life and family farms, ranches, and businesses built and nurtured by those before them.

In an unprecedented effort, local watershed groups and county drought advisory committees rallied to meet the challenges of the drought. Through the mounting impact of six consecutive drought years, stakeholders of watershed groups kept the dialog of cooperation alive, developing creative and resourceful strategies to cope with severe water shortages. Water commissioners did their best to allocate precious surface water equitably among water users, seeing that users got most of the water to which they were entitled.

And working with state and federal scientists and officials, water users voluntarily helped minimize the unavoidable impacts to Montana's fabled trout fisheries, helping protect this valuable resource from crashing. In dryland and grazing areas of the state, ad hoc county drought committees worked closely with local USDA officials to ensure emergency assistance decision makers looked beyond numbers to verify the extent of hardship to farmers and ranchers. Now Montanans are looking forward to a return to some semblance of the good years of the past.

**Executive Summary**

The Montana Governor's Drought Advisory Committee is charged with monitoring and reporting water supply and moisture conditions, enabling Montanans to make timely and informed decisions to mitigate drought impacts in a proactive manner. The committee met March 9, and will meet again April 20, 2006, to assess moisture and water supply conditions pursuant to MCA 2-15-3308. The committee is in agreement at this time that, for the most part, Montana is well into recovery from drought conditions that began essentially in 1999 and continued into 2005. Whether the ongoing recovery can be sustained, however, will be a question only time will be able to tell.

The Montana Drought Status Map, by county for March 2006 indicates that presently, there are 46 counties in the No Drought category, with nine counties in the Slightly Dry category. Only one county, Carbon, is in the Moderately Dry category, down from December 2005 when eight counties remained in that category, and 11 counties were rated as Slightly Dry. There are no counties in either the No Drought – Moist, Severely Dry, or Extremely Dry categories at this time. See: http://nris.state.mt.us/drought/status/mar06/drtstatusbg.jpg
December 2005 Status Map: http://nris.state.mt.us/drought/status/Apr05/drtstatusbg.jpg

All but one of eight counties rated as Slightly Dry category for March 2006 are located east of the Continental Divide, including Glacier, Pondera, Teton, Lewis and Clark, along the Rocky Mountain Front; Big Horn and Powder River along the border with Wyoming; and Sheridan in the northeast corner of the state. West of the Continental Divide, all counties are in the No Drought category with the exception of Powell, which was rated as Slightly Dry in March.

Mountain snow accumulation over the course of February helped boost the water supply outlook dramatically west of the Continental Divide from December 2005, when all counties but three were rated as either Moderately or Slightly Dry. The five east side Rocky Mountain Front counties have also seen the water supply outlook improve from early February 2006, when they were all rated as Moderately Dry, to Slightly Dry for March. Mountain snowpack for the headwaters of the Missouri and Yellowstone Rivers is average as of April 1. A number of precipitation records for valley locations have been broken since the end of March across the state.
See: http://www.wrh.noaa.gov/tfx/pdfs/hydro/drought_semi.pdf

At this time, most of Montana has emerged from the protracted grip of drought. Normal to above normal precipitation received over significant parts of the state to date is providing relief from the meteorological and agricultural, or short-term effects of drought. However, in its early stages, recovery can be tenuous and the current position of experts is one of cautious optimism. In places, long term residual effects of the hydrological and socio-economic aspects of the drought linger.

It is important to remember that low streamflow, wildfire, and other impacts from dry and warm weather are not uncommon by late summer in Montana in any given year. The potential for a return of drought in Montana at this time is ***Low***, with favorable short- and medium-range forecasts for cool temperatures and above average precipitation. Heavy precipitation is expected for early April for Montana. See: http://www.cpc.ncep.noaa.gov/index.htm

## CURRENT WATER SUPPLY AND MOISTURE CONDITIONS

### Mountain Snowpack

Most of the annual streamflow in Montana originates as snowfall that accumulates high in the mountains during fall, winter, and spring. Aquifers, lakes, streams, and reservoirs are largely dependent on runoff from mountain snowpack. As the snow pack accumulates, hydrologists forecast the runoff that will occur when it melts, and in turn, streamflow for the summer months. Montana's mountain snowpack generally accounts for 80 percent of streamflow in spring and early summer in Montana's higher elevation river valleys.

The Natural Resources Conservation Service (NRCS) reported that, as of April 7, 2006 the snow water equivalent of mountain snowpack ranged from slightly below average to above average, or between 80 and 110 percent statewide for the water year, October 1, 2005 through April 7, 2006. The snow water content of mountain snowpack both east and west of the Continental Divide, averages about 101 percent of the 30-year average for the period 1971 through 2000, and is 169 percent of water content at this time in 2005. As of April 10, west of the Divide, the Kootenai River basin had snow water content of 106 percent; the Flathead River basin 101 percent; the Upper Clark Fork 104 percent; the Bitterroot 114 percent; and the Lower Clark Fork 99 percent of the 30-year average.

East of the Divide, the Upper Missouri River basin was 112 percent; the Missouri Main Stem was 115 percent; the Lower Missouri 106; the Upper Yellowstone 97; the Tongue 73, and the Lower Yellowstone 79 percent of the 30-year average for snow water content. Records indicate that the maximum snow water content of Montana's mountain snowpack occurs about April 10 each year. See: Table 1. Remaining Water Content of Mountain Snowpack in Montana – Water Year to Date.

### Precipitation

According to the NWS Drought / Precipitation Summary for the period of October 1, 2005 through March 31, 2006 (water year to date) precipitation for Helena stood at 109 percent of average, Miles City was 133 percent; Billings 128 percent; Baker 101; Jordan 151; Missoula 122; Butte 104; Dillon 111; Bozeman at MSU 131, Glendive 150, Lewistown 110, Great Falls 126, and Cut Bank 58 percent of average precipitation. Following one of the warmest Januarys across the state, warmth continued into early February, giving way to a fierce cold spell mid-month, with the month ending with daily highs in the lower 70s in the Southeastern part of the state. See: http://www.wrh.noaa.gov/tfx/pdfs/hydro/drought_semi.pdf

The March 27, 2006 Crop Weather Report, issued by the Montana Field Office of the USDA Agricultural Statistics Service, noted that the state "experienced moderate to heavy precipitation" for the month of March at valley locations. According to the NWS, nearly two inches of precipitation was recorded on March 4 from a storm at Harlem, setting a statewide record for that day. On March 18 Great Falls experienced record high precipitation of 0.34 inches, edging out the record of 0.33 inches for that day in 1968, and Helena doubled its record for the day with 0.36 inches compared with the record of 1987 with 0.18 inches. Billings broke its record for precipitation received in one day with 1.13 inches on March 29. Great Falls broke its monthly total precipitation record for March with 2.02 inches, the wettest water year at months end since 1992, and was joined by Miles City (1977), Billings (1978), and Bozeman and Lewistown. Miles City, Billings, Great Falls, and Kalispell have the wettest calendar year as of March 31 in 15 to over 30 years. See: http://www.wrh.noaa.gov/tfx/pdfs/hydro/drought_semi.pdf

According to the March 31 Billings Gazette, "Two days of record-breaking rainfall more than made up for a worrisome moisture deficit that had been building on the plains of south-central Montana since the first of the year." This storm total brought the calendar year total for Billings to 2.70 inches, exceeding the historical average for this period of 2.46 inches. The article went on to note that the storm resulted in the second highest precipitation amount for March in Billings with 2.67 inches, just short of the March 1954 record of 2.70 inches.
http://www.wrh.noaa.gov/tfx/dbgraphs.php?wfo=tfx&loc=monthly&fx=marpcntnorm.png

The Yellowstone County Extension Agent was quoted as being pleased; noting that all of the moisture received was going into the ground and not running off. Nevertheless, the article notes that long-term effects of seven consecutive years of drought for south central Montana persist, including depressed ground water levels. The storm delivered needed moisture to outlying areas as well with Huntley receiving 1.21 inches, nearly an inch at Roundup, and one-half inch or more at Park City and Yellowtail Dam.

On April 5-7 a precipitation event worked its way through the state delivering record-breaking amounts of rain. The National Weather Service (NWS) at Great Falls reported that Lewiston had received 1.25 inches on April 6; Dillon received .86 inches; White Sulphur Springs 1.20 inches; and Helena, .94 inches for the day. Storm totals included 1.69 inches for Helena; Cascade 1.90 inches; Boulder (Jefferson County) 1.11 inches; Great Falls 1.09 inches; Choteau 1.09 inches; Valier 1.27 inches; Bozeman 1.81 inches; Stanford 1.07 inches, and Ulm 1.63 inches of rain.
See: http://www.wrh.noaa.gov/tfx/main.php?wfo=tfx&pil=lsr&sid=tfx Look for "Storm Total."

Billings NWS reported that new record daily maximum rainfall was set at Miles City with 1.33 inches breaking the old record of .29 inches set in 1964. New records were set for precipitation for April 6 at Great Falls with .74 inches; Bozeman Airport with .58 inches; and at Helena with .94 inches breaking the existing record of .44 inches set in 1914. A record maximum daily rainfall was set at Missoula with 1.87 inches, breaking the one day record of 1.83 inches set on May 25, 1980, and breaking the April 6 record of .45 inches set in 1897. On April 2, Butte broke its 1935 daily precipitation record for that day of 0.50 inch receiving .58 inches.
http://www.wrh.noaa.gov/tfx/image.php?wfo=tfx&type=data2&loc=hydro&path=hydro&fx=watyr_pcntnorm.png

According to the NRCS March 1, 2006 Montana Water Supply Outlook Report, mountain and valley precipitation for the period of October 1, 2005 through February 28, 2006 was 112 percent of average and 169 percent of last year statewide. West of the Continental Divide, mountain and valley precipitation for the water year was 109 percent of average and 171 percent of last year, while east of the Divide, water year precipitation was 115 percent of average and 168 percent of last year at this time.

West of the Continental Divide, February Mountain and valley precipitation was 100 percent of average and 367 percent of last February and East of the Divide, 95 percent of average and 260 percent of precipitation received last February.

**Precipitation Statewide for Selected Time Periods**
**October 1, 2005 - March 31, 2006**
**National Weather Service**

| Division | 10/1/05 - 3/31/06 | 3/1/06 - 3/31/06 |
|---|---|---|
| Western | 113 | 72 |
| Southwest | 129 | 77 |
| Northcentral | 130 | 144 |
| Central | 123 | 132 |
| Southcentral | 109 | 105 |
| Northeast | 106 | 94 |
| Southeast | 132 | 102 |

**Soil Moisture**

According to the National Climate Prediction Center (CPC), the Palmer Drought Severity Index (PDSI) for the week ending March 25, 2006, indicates that the Central and Southwest climate divisions are currently rated in the Moderate Drought category, the Northcentral, Southcentral, Northeast, and Southeast divisions are rated within the Near Normal category, and the Western climate division is rated as within an Unusual Moist Spell. Currently, no Montana climate division is rated currently within the Severe or Extreme Drought categories. Current PDSI figures indicate that about two inches of precipitation is needed for soil moisture in the Central and Southwest climate divisions to reach the Near Normal range.

According to the April 2, 2006 Montana Agricultural Statistics Service Crop Weather Report, topsoil moisture across the state is rated 4 percent very short, and 20 percent short, compared with 2 and 33 percent at this time in 2005. Topsoil is rated at 70 percent adequate compared with 41 percent at this time last year and 6 percent surplus. Subsoil moisture is rated 14 percent very short and 37 percent short, compared with 55 and 31 percent at this time in 2005. Subsoil moisture is rated as 48 percent adequate, compared with 13 percent this date in 2005.

Winter wheat crop conditions are similar to last year at this time and are rated one percent very poor, 8 percent poor, 49 percent fair, 36 percent good, and 6 percent excellent. Last year at this time, the winter wheat crop was rated 4 percent very poor, 9 percent poor, 45 percent fair, 34 percent good, and 8 percent excellent. Winter wheat remains at 49 percent dormant, with 42 percent greening, compared to only 18 percent dormant and 62 percent greening at this time in 2005. There are no reports of frost damage to winter wheat at this time, despite marginal protection from snow cover this winter across the state, according to the Crop Weather Report. Much needed precipitation and warm temperatures are softening up the frozen ground and promoting winter wheat growth, the April 2 Report concludes.

## Reservoir Storage

As of April 3, 2006 the U.S. Geological Survey reported that water storage was above normal at two, normal at three, and below normal at one of six major hydroelectric reservoirs in Montana. Storage for March was above normal for Lake Koocanusa and Hungry Horse Reservoir. Storage was normal at Canyon Ferry, Bighorn and Flathead Lakes, and below normal at Fort Peck Lake. Water storage remained normal at two of the four major irrigation reservoirs, Lima and Fresno reservoirs, and below normal at Gibson and Clark Canyon reservoirs. (See Table 3.)

According to the NRCS March 1, 2006 Water Supply Outlook Report, major reservoir storage statewide was 86 percent of average and 99 percent of last year at this time. West of the Continental Divide, reservoir storage was 149 percent of average and 92 percent of March 1, 2005 levels. East of the Divide, reservoir storage was 69 percent of average and 103 percent of storage last year at the same time. The current snow water content of mountain snowpack indicates that, for the most part, surface water inflow to storage projects will be within the normal range.

The U.S. Bureau of Reclamation reports that, as of April 1, 2006 storage at Clark Canyon Reservoir, in the headwaters of the Missouri River basin, was 72 percent of average at 107,149 acre-feet, or 180 percent of storage at this time in 2005 when contents were 59,461 acre-feet. Spring snowstorms brought the water content of the mountain snowpack close to 110 percent of average in parts of the headwaters of the Missouri River basin. Inflows are much improved over recent years and Reclamation is hopeful that irrigators will receive their full contract allotments of water from Clark Canyon. Canyon Ferry Reservoir is currently at 87 percent of average with 1.26 million acre-feet and 91 percent of storage at this time in 2005. Canyon Ferry is expected to fill by late June with releases increased to the target rate of 5,500 cfs to allow storage for inflows and to support downstream fisheries. (Table 3. U.S. Bureau of Reclamation Reservoirs).

As of April 1, 2006 Reclamation reports that Gibson Reservoir, located on the Sun River, had contents of only 34 percent of average, due to poor inflows and high demand in 2005. With average snow water content of headwaters mountain snowpack as of April 1, Reclamation is hopeful that water users will avoid shortages of irrigation water this summer. Sherburne Reservoir on the St. Mary River is currently at 116 percent of average storage. Sherburne supplies water from the St. Mary River Basin to the Milk River Basin water users.

Fresno and Nelson reservoirs on the Milk River are 132 and 102 percent of average, respectively, and 176 and 98 percent of contents last year at this time. The reservoirs are expected full pool with water users unlikely to experience shortages later in the season with normal precipitation. Lake Elwell, on the Marias River, is at 109 percent of average with a good supply outlook and should fill to within two feet of full pool by mid-June. With 93 percent of average snowpack remaining, Lake Elwell will hopefully meet the planned target release of 500 cfs to the Marias River, enough to sustain the fishery there.

Hungry Horse Reservoir, on the South Fork of the Flathead River had contents at 128 percent of average storage as of March 1 and is expected to fill to full pool in 2006. The water supply outlook for Bighorn Lake on the Bighorn River is good this year with storage of 99 percent of average as of April 1. Releases at Bighorn are at 2,500 cubic feet per second to the Bighorn River downstream fishery as of March 9, and the reservoir is expected to fill to full pool for the first time in several years. See: http://www.dnrc.mt.gov/drought/PowerPoints/mar2006/USBR.pdf

Nine of 13 state water storage projects had contents ranging from 90 to 117 percent of average, with four projects ranging between 70 and 81 percent of average, as of March 31. In the Musselshell River basin Bair, Deadman's Basin, and Martinsdale reservoirs were 70, 79, and 99 percent of average, compared to last year at this time when they were 79, 40, and 44 percent of average. Storage at North Fork of the Smith Reservoir is lower than this time last year, but will most likely fill. Middle Creek, Nevada Creek, and East Fork of Rock Creek reservoirs are above average at 114, 117, and 102 percent of average. Nilan Reservoir on the Sun River is at 81 percent and Ruby Reservoir 91 percent of average, as of March 31. The prospects for additional storage are positive, with favorable forecasts for mountain and valley precipitation in coming weeks.
See: (Table 4. State-Owned Reservoirs, March 31, 2006).

**Streamflow**

According to an April 3, 2006 news release from the U.S. Geological Survey, monthly mean streamflow for April was below normal at five, and normal at three of eight long-term gauging stations. The monthly mean streamflow was below normal on the Blackfoot River near Bonner, the Yaak River near Troy, the Clark Fork at St. Regis, the Marias River near Shelby, and at Rock Creek below Horse Creek near the International Boundary. The monthly mean streamflow for April was normal for the Yellowstone River at Corwin Springs, the Yellowstone River at Billings, and the Middle Fork of the Flathead River near West Glacier.
(See: Table 2. March 2006 Streamflow in Montana)

The Big Hole River near Melrose and the Jefferson River at Twin Bridges were well above their average flows at 1,440 and 2,060 cubic feet per second (cfs) as of April 7. The Jefferson near Three Forks was above average at 2,570 cfs when compared to the average for that date at about 1800 cfs; the Gallatin River at Gallatin Gateway was above average at about 416 cfs, compared to an average for this date of 370 cfs; and the Smith River was flowing at 522 cfs compared with the average at about 174 cfs. The Dearborn River at Craig was flowing at 775 cfs compared to an average of 131 cfs; the Missouri River at Ulm was below average at 8,030 cfs when compared with the 48-year average flow for April 7 of about 5,585 cfs; and the Missouri at Virgelle was above average at 8,550 cfs compared with the average flow of 7,180 cfs.
See: http://waterdata.usgs.gov/mt/nwis/current?type=flow

The Yellowstone River at Corwin Springs, upstream of Livingston, reached 1,330 cfs on April 7, above the 99-year average for that date of about 1,080 cfs. The Yellowstone River at Billings reached 3,150 cfs, close to the 78-year average for that date of about 3,160 cfs. Late spring snowstorms usually play a key role in increasing snow water content in the Upper and Lower Yellowstone River basins and usually appear in mid-April. The Yellowstone River at Miles City measured 7,440 cfs, above the 78-year average for that date of 6,975 cfs.

West of the Continental Divide, the flow rate of Middle Fork of the Flathead River, as of April 7 was 3,250 cfs, compared with an average flow of 1,530 cfs for that date. In the headwaters of the Clark Fork River, flow of the Blackfoot River near Bonner was high at about 3,570 cfs, compared with an average of 1,200 cfs. The Yaak River at Troy measured 2,110 cfs as of April 7 compared to an average flow for that date of 1,215 cfs. And the St. Regis River near St. Regis measured 1,520 cfs, compared with an average of 965 cfs.

According to the NRCS March 1, 2006 Montana Water Supply Outlook Report, streamflow statewide was forecasted to range from 89 to 100 percent of average west of the Continental Divide and between 81 and 99 percent of average east of the Divide for the period of April through July. As was true at this time last year, May and June rains will be necessary to maintain average streamflow from late spring into early summer. As of May 1, streamflow of the lower Clark Fork River is expected to range from 89 to 98 percent of average from May to July. The Bitterroot River is expected to range from 103 to 112 percent, the Flathead River from 95 to 104 percent, and the Kootenai River from 90 to 99 percent, much better than forecast at this time in 2005.

East of the Continental Divide, streamflow for the Missouri River was forecasted to range from 78 to 98 percent of average as of March 1, 2006. The lower Yellowstone River was expected to range from 75 to 89 percent of average, and the upper Yellowstone between 98 and 108 percent for the period of May to July. Whether improved flow prospects can be sustained into late summer will depend largely upon continued precipitation in the average to above average range.

**Surface Water Supply Index**

The Natural Resources Conservation Service generates the Surface Water Supply Index (SWSI) as a projection of surface water availability for 53 Montana river basins based on mountain snowpack, mountain and valley precipitation, streamflow, soil moisture, and reservoir storage. The SWSI is used to forecast surface water supply, and is best applied to mountainous areas with surface water supplies that are primarily dependent on spring runoff of mountain snowpack. See (Map Figure 1. SWSI Values as of April 1, 2006)

As of April 1, 2006, only one of the state's river basins was ranked as Extremely dry (-3.0 to -4.0). The Missouri River below Fort Peck has a SWSI of -3.4. Two other river basins had SWSI values from –2.0 to -2.9, or Moderately Dry, and nine river basins were rated in the Slightly Dry category. As of April 1, 2006, 41 river basins were in the Near Average to Extremely Wet categories.
See: http://nris.state.mt.us/Nrcs/Apr06/swsi04_06.pdf

**Ground Water**

Figure 1, below shows the percent of water-level measurements in climate sensitive wells that were above or below fourth-quarter average water levels each year between 1999 and 2005. The data come from the 900-well statewide water-level monitoring network maintained by the Ground Water Assessment Program at the Montana Bureau of Mines and Geology. Although about 6 percent of fourth-quarter water levels remain more than 10 ft below their averages, water levels in about 30 percent of the wells are only 1 to 5 feet below their averages. When drought was most intense in 2001-2003, more than 40 percent of the fourth quarter water levels were in this category.

The 2005 percentage is similar to that of 1999, near the beginning of the drought. The late 2005 decreased percentage within this category corresponds with increases in the -1 to 0, 0 to +1, and +1 to +5 ft categories. In 2004 and 2005, fourth-quarter measurements from more than 10 percent of the wells were again in the +1 to +5 category. It appears that fourth-quarter water levels in climate sensitive wells are responding to near average precipitation in 2005 and have moved closer to their seasonal averages.

Although numerous water-level measurements from network wells show limited recovery, one area east of the Continental Divide where 5-6 feet of recovery has occurred, is the Blacktail Deer Creek drainage southeast of Dillon. The aquifer in the Blacktail Creek drainage supports sprinkler irrigation. West of the Continental Divide, water-levels in wells on the east side of the Kalispell Valley have recovered between 7 and 15 feet to levels similar to those observed in 2000. This aquifer supports many domestic wells.

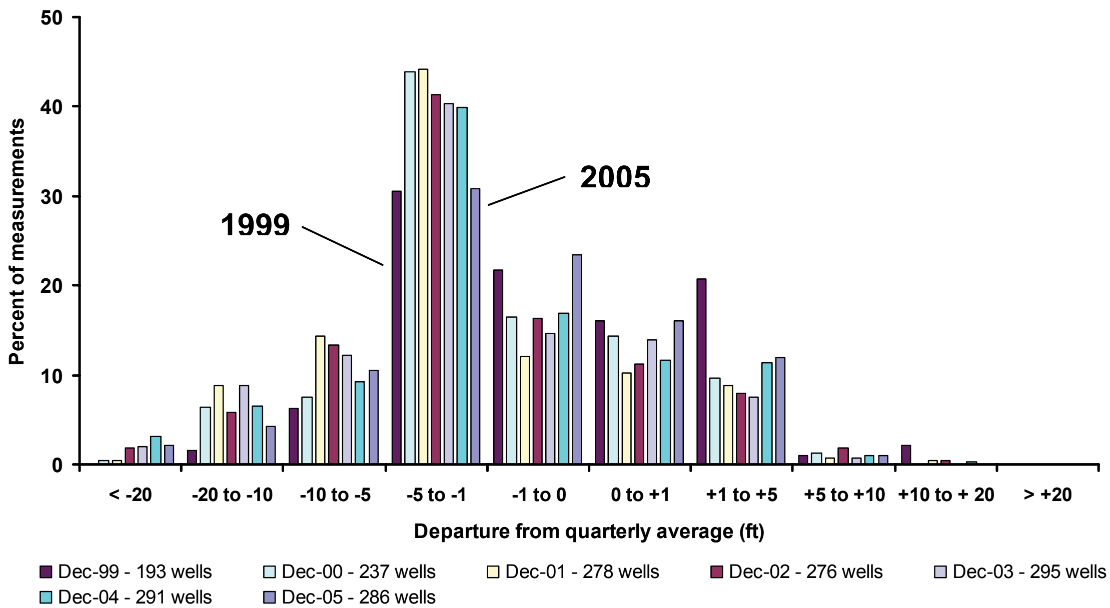



Figure 1: Percent of water-level measurements in climate-sensitive wells above or below October-December quarterly water-level averages for the years 1999-2005.

**U.S. Drought Monitor**

The Drought Monitor map is a widely used multi-agency, cooperative weekly assessment product that describes the degree, type, and extent of drought conditions across the nation. Montana water supply and moisture experts are consulted weekly in the national discussion regarding the data and information considered in the demarcation of areas and degree of drought impacts for Montana. See: http://drought.unl.edu/dm/monitor.html

The Drought Monitor ranks the degree of drought from Abnormally Dry (D-0) to Moderate (D-1), Severe (D-2), Extreme (D-3), or Exceptional (D-4). It also distinguishes between Hydrological (long-term) and Agricultural (short-term) drought. The Drought Monitor's April 8 Objective Long-term Experimental Blend map indicates the seven climate divisions of Montana are within the normal range. See: http://www.cpc.ncep.noaa.gov/products/predictions/experimental/edb/lbfinal.gif

The Climate Prediction Center's U.S. Seasonal Drought Outlook map released March 16 and valid through June 2006 calls for no drought with some improvement along the Rocky Mountain Front. See: http://www.cpc.ncep.noaa.gov/products/expert_assessment/season_drought.gif

**Climate Forecasts**

According to the National Climate Prediction Center (CPC) the 30-day outlook for through April calls for normal temperatures except for some cooler than average west of the Divide, and average precipitation statewide. At this time, the 3-month long-lead outlook for June through August, calls for temperatures to be cooler than average across the state, and for precipitation to be average statewide with the northeast slightly wetter than average.
See: http://www.cpc.ncep.noaa.gov/index.htm

According to the National Weather Service, the 8- to 14-day outlook through April 18-24 for the state calls for temperatures to be above average in the southeast and blow average in the northwest corner of the state, and precipitation to be average statewide. The long- and short-lead outlooks call for "a typical La Nina pattern," with dry conditions across the south and wet conditions across the Pacific Northwest and the Northern Plains.

**Wildfire Potential**

Montana DNRC reported that 9 human and lightning spring wildfires had burned 18.5 acres as of April 7, 2006. The fire reports came in from the Southwestern and Central region land offices. The Northern Rockies Coordination Center (NRCC), Monthly Fire Weather / Fire Danger Outlook for April 2006 reported that at this time, 1000-hour dead fuel moisture levels are within the normal range on the plains, at 15 to 19 percent, and normal to above in the mountains, at 21 to 26 percent. The NRCC early season fire assessment that can be found at: http://gacc.nifc.gov/nrcc/index.htm

**Montana Drought Status by County**

The Montana Governor's Drought Advisory Committee developed and implemented a new system of assessment of overall water supply and moisture conditions in 2004. And for the first time, the assessment was performed monthly, on a year around basis, in 2005. The Committee's technical group assesses conditions for each county using a variety of moisture and water supply indices and field reports from county extension agents and state and federal field offices.
The assessment classifies each county in one of six descriptive categories ranging from *"No Drought – Moist"* to *"Extremely Dry."* Other categories include *No Drought, Slightly Dry, Moderately Dry, Severely Dry*, and *Extremely Dry*. See: http://nris.state.mt.us/Drought/status/

The National Weather Service climate divisions are clearly visible on the Montana Drought Status Map for the seven divisions of the state: western (Montana west of the Divide), southwest, northcentral, central, southcentral, northeast, and southeast. The map legend also notes the status categories, Moderately Dry and Severely Dry (or worse), which correspond with the *"Drought Alert"* and *"Severe Drought"* action levels used in the Montana Drought Plan. The plan has specific actions for each response level, with actions for state, federal, and local government to take, ensuring mitigation occurs in a timely manner.

The March 9, 2006 Montana Drought Status County Map, shows one county classified as Moderately Dry and 8 counties as Slightly Dry. The other 47 counties are classified in the No Drought category. There are no counties in the "No Drought – Moist," or the "Extremely Dry" categories in the state, currently. The Drought Advisory Committee's assessment team will again assess the state, by county on April 11, 2006.

The Montana Drought Status Map is classified along county lines, in part, because USDA emergency assistance programs are assessed and approved on a county-by-county basis. Although the status map plays no official role in the determination of eligibility for assistance by USDA, it can be used as a cross reference map product.

**Conclusion**

The Montana Drought Plan defines drought as an extended period of below normal precipitation that causes damage to crops and other ground cover, diminishes natural streamflow; depletes soil and subsoil moisture, and because of these effects, causes social, environmental, and economic impacts to Montana. At this time water supply, moisture conditions, and forecasts indicate that Montana is, for now, in a trend of recovery from drought.

At this time, the probability of drought through July remains ***Low*** for water users in river basins with average or better mountain snowpack, valley precipitation, and reservoir storage. The potential for drought to impact dryland farming and livestock grazing through June is ***Low*** across the state.

Provided that Montana receives normal precipitation in coming months, no water supply shortages are expected for the 2006 growing season. It is important, however, to remember that low streamflow, wildfires, stressed dryland crops, periods of high temperatures and low precipitation can be expected during late summer in any given year in Montana.

## RESPONSES TO WATER SUPPLY AND MOISTURE CONDITIONS

At the March 9, 2006 meeting of the Committee, it was decided that the Governor would send a letter to the Congressional delegation outlining the needs of Montanans related to drought, including assistance programs and policy change.

### National Drought Preparedness Act of 2005

National drought policy has been under review for over four years as the shortcomings of existing drought assistance programs became apparent with nearly 40 percent of the land area of the country in drought in 2003-2004, according to the U.S. Drought Monitor. The absence of a national drought policy that coordinated response across federal agencies made it readily apparent that the system for drought was woefully inadequate. The Western Governors Association (WGA) has taken a leading role in advocating for national drought policy reform since 2001.

As one of the Lead Governors on Drought, Governor Schweitzer signed a May 10, 2005 WGA letter to Senators Domenici and Bingaman in support of S. 802, the National Drought Preparedness Act of 2005. Senate Bill 802, sponsored by Senators Baucus and Domenici, would establish a comprehensive national drought policy that designates the U.S. Department of Agriculture as the lead agency for coordinating and integrating drought assistance programs using a National Drought Council for guidance and oversight. The Bill would encourage drought planning at all levels and focus federal funding on proactive mitigation of drought impacts. Emphasis would shift from responding to drought to preparedness for drought. The companion bill in the House of Representatives, H.R. 1386, is sponsored by Representatives Hastings and Rehberg.

### The National Integrated Drought Information System (NIDIS)

On April 6, 2006 a bill was introduced in the U.S. House of Representatives by Reps. Hall and Udall calling for the establishment of the proposed National Integrated Drought Information System (NIDIS). NIDIS would pull together a myriad of existing sources of real-time water supply and climate data analysis and forecasting capabilities into a system that would support informed decision-making at all levels of government, enabling water users and resource managers to assess risk from drought to their businesses, farms and ranches, and other areas of vulnerability. Significant progress has been made with the implementation of NIDIS under the leadership of National Oceanic and Atmospheric Administration (NOAA) in partnership with WGA.

On April 27, 2006 Governor Schweitzer will testify regarding drought preparedness before the Senate Committee on Commerce, Science, and Transportation on behalf of the Western Governor's Association (WGA) in Washington, D.C. Governor Schweitzer is currently the WGA Lead Governor on Drought. He has been involved with the policy articulated in the National Drought Preparedness Act as the representative of agriculture on the National Drought Policy Commission from 1998-1999, when Congress authorized hearings across the U.S., one of which was held in Billings in 1999, where many officials and citizens testified in support of drought policy reform.

## Internet Site

The Montana Natural Resources Information System (NRIS) has provided support to the drought committee for over six years managing the committee's Montana Drought Monitoring Internet site. NRIS site continues to contain real-time moisture and water supply data, and water conservation information links. See: http://nris.state.mt.us/drought/

DNRC has developed a new Internet site for the committee pursuant to its role as the state agency with staffing responsibility to the Drought Advisory Committee. The new site can be seen at: http://test.drought.mt.gov/ (Cannot be released to public until after April 17)

## Support for Watershed Groups and Local Drought Committees

Most of the some 50 watershed groups across the state have endured drought by pulling together stakeholder groups to coordinate planning for drought. Drought Committee member agencies supply technical, data, and funding support for eligible watershed and local drought planning groups. Although the water supply is forecast to meet most demands in 2006, watershed groups continue to meet on a regular basis and work to further improve water conservation and management.

DNRC hydrologists, engineers, and planners work closely with watershed groups, irrigation and canal companies, and individual water users to maintain and rehabilitate water storage projects and provide water measurement support to assist groups in the implementation of water use plans. For example, DNRC hydrologists are working with water users and partner agencies in the Upper Big Hole River to implement a Candidate Conservation Agreement with Assurances (CCAA) for protection of the fluvial arctic grayling. The CCAA will create site-specific conservation plans with landowners to improve irrigation delivery and efficiency, grazing management, and riparian protection. In return, landowners are provided assurances that protect them from further regulatory enforcement should the grayling get listed as an endangered species.

## Reclamation States Emergency Drought Relief Assistance Act

The Bureau of Reclamation is authorized to provide funding assistance under the Reclamation States Emergency Drought Relief Act, Public Law 102-250, to mitigate effects of drought upon wetlands, rivers and streams, reservoirs, and municipal water supplies. Eligible projects include temporary construction projects that manage limited supplies of water. The Act is not a grant program. Reclamation contracts with the entities for the work to be performed and provides project oversight and monitoring. The law requires that only "temporary" construction projects be funded, except for municipal well development.

Reclamation approved nine temporary water conservation projects in 2004 for sealing leaking canals or ditches with a biodegradable sealant applied by spraying. In 2005, Reclamation denied approval for about 30 such proposals from water user groups and canal companies totaling about

$300,000. Due to concerns about potential toxicity of the canal sealant product, Reclamation commissioned a study in cooperation with the Desert Research Institute in Reno, Nevada.

The Drought Advisory Committee intended to re-submit the unfunded requests from 2005 to Reclamation for 2006, but was advised that Reclamation had not reached a decision regarding the approval of use of the sealant projects. The window for performing the canal work will pass for the season in coming weeks. The state has not heard from Reclamation regarding approval or denial for funding the projects for 2006. The Canal Seal product is believed to be safe when applied according to manufacturer's instructions. It has been used safely for over 40 years in agricultural crop and food production across the western United States according to numerous journal articles.

A number of small towns received assistance from Reclamation for municipal water supply problems over the period 2001-2005, including Circle, Sage Creek Colony, Ulm School, Pine Creek School, Hobson, Ryegate, Geraldine, Roy, Melstone, Galata, Shelby, Fairfield, Ingomar, and Forsythe. Requests and questions for Reclamation's drought relief program can be directed to Mr. Jess Aber at Montana Department of Natural Resources and Conservation at (406) 444-6628.

**Drought Advisory Committee Meetings**

In 2006, the committee has met March 9, and has scheduled the dates of April 20, and May 18 to assess and report conditions heading into the 2006 growing season. Future meetings for 2006, if warranted by conditions, are scheduled for June 15, July 27, August 17, September 21, and October 19. April and October meetings are mandated by the statute regardless of conditions at the time.

The committee will continue to monitor and report conditions closely and issue the Montana Drought Status Map, by county, on a monthly basis. Staff will continue to provide support to Montanans in locating sources of assistance for projects that serve to mitigate impacts during future drought years. Staff will also continue to work toward changes in national drought policy that serve to benefit Montana.

**MAP FIGURES**

Montana Drought Status by County
March 1, 2006

http://nris.state.mt.us/Drought/status/

Montana Surface Water Supply Index
March 1, 2006

http://nris.state.mt.us/Nrcs/Mar06/swsi03_06.pdf

U.S. Drought Monitor Map

http://www.drought.unl.edu/dm/monitor.html

U.S. Seasonal Drought Outlook Map (CPC)

http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html

Palmer Drought Severity Index

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/palmer.gif

Montana Precipitation – Water Year through April 1, 2006

http://www.wrh.noaa.gov/tfx/tx.php?wfo=tfx&type=html&loc=text&fx=wateryear

Montana Precipitation – March 2006

http://www.wrh.noaa.gov/tfx/tx.php?wfo=tfx&type=html&loc=text&fx=watermonth

**TABLES**

| TABLE 1<br>**Remaining Water Content of Mountain Snowpack in Montana and Water Year-to-Date Precipitation [1]** | | |
|---|---|---|
| Based on Mountain Data from NRCS SNOTEL Sites<br>As of Monday, April 10, 2006 | | |
| **Basin** | **Water Year Snow Water Equivalents [2] (% of average)[3]** | **Water Year-to-Date [4] Precipitation (% of average)** |
| Kootenai River | 106 | 103 |
| Flathead River | 101 | 103 |
| Upper Clark Fork River | 104 | 100 |
| Bitterroot River | 114 | 107 |
| Lower Clark Fork River | 99 | 104 |
| Jefferson River | 112 | 113 |
| Madison River | 113 | 116 |
| Gallatin River | 106 | 108 |
| Missouri River Headwaters | 112 | 114 |
| Headwaters Missouri Mainstem | 115 | 109 |
| Smith, Judith, & Musselshell Rivers | 116 | 119 |
| Sun, Teton, & Marias Rivers | 97 | 94 |
| Missouri Mainstem River Basin | 106 | 106 |
| St. Mary & Milk Rivers | 86 | 99 |
| Upper Yellowstone | 97 | 101 |
| Tongue River (Wyoming) | 73 | 92 |
| Lower Yellowstone | 79 | 90 |

Notes

(1) Information taken from Natural Resource Conservation Service Snow-Precipitation Update.
(2) A "snow water equivalent" is the depth of snow equivalent to one inch of water.
(3) Reference period for average conditions is 1971-2000.
(4) October 1, 2005 to present

**TABLE 2**
**March 2006 Streamflow in Montana [1]**

| Station Name | Monthly [2] Mean Flow (cfs) | 1971-2000 Average Monthly Flow (cfs) | % of Average Flow |
|---|---|---|---|
| Yaak River near Troy | 461 | 678 | 68 |
| Blackfoot River near Bonner | 604 | 880 | 69 |
| Clark Fork at St. Regis | 3,250 | 4,740 | 69 |
| Middle Fork of Flathead near West Glacier | 979 | 1,010 | 97 |
| Marias River near Shelby | e370 | 647 | e57 |
| Rock Creek below Horse Creek, near International Boundary | e44 | 86.5 | e51 |
| Yellowstone River at Corwin | 999 | 968 | 103 |
| Yellowstone River at Billings | 2,530 | 3,130 | 81 |

Notes: e - estimated

(1) Information is provided by the U.S. Geological Survey (USGS). According to the USGS, the eight gaging sites in Table 2 are representative of March 2006 streamflow conditions throughout Montana.

(2) Data is provisional and subject to revision.

**TABLE 3**
**U.S. Bureau of Reclamation Reservoirs**

BUREAU OF RECLAMATION
MONTANA AREA OFFICE

## RESERVOIR OPERATIONS REPORT

**01-Apr-2006**
**ALL CONTENTS IN ACRE-FEET**

| | | | | RESERVOIR CONDITIONS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | ELEVATION (FEET) | | CAPACITY (ACRE-FEET) | | 2006 | | | MTN. SNOW WATER CONTENT (INCHES) | | | |
| RESERVOIR NAME | NORMAL FULL POOL | TOTAL CAPACITY | AVERAGE CAPACITY | 2005 | 2006 | 2005 | 2006 | % FULL | % OF AVG | % OF Last Yr | 2005 | 2006 | AVG | % OF AVG |
| CLARK CANYON | 5546.10 | 174,368 | 148,766 | 5517.56 | 5531.67 | 59,461 | 107,149 | 61 | 72 | 180 | 10.73 | 15.56 | 14.65 | 106 |
| CANYON FERRY | 3797.00 | 1,891,888 | 1,450,195 | 3780.79 | 3776.52 | 1,381,592 | 1,262,840 | 67 | 87 | 91 | 12.47 | 18.60 | 17.44 | 107 |
| GIBSON | 4724.00 | 96,477 | 47,993 | 4689.31 | 4635.25 | 55,974 | 16,251 | 17 | 34 | 29 | 7.08 | 11.98 | 12.97 | 92 |
| PISHKUN | 4370.00 | 46,694 | 34,395 | 4361.54 | 4360.43 | 34,822 | 33,269 | 71 | 97 | 96 | N.A. | N.A. | N.A. | N.A. |
| WILLOW CREEK | 4142.00 | 31,848 | 21,925 | 4138.08 | 4138.68 | 26,789 | 27,119 | 85 | 124 | 101 | N.A. | N.A. | N.A. | N.A. |
| LAKE ELWELL | 2993.00 | 925,649 | 675,079 | 2977.23 | 2981.02 | 716,472 | 734,061 | 79 | 109 | 102 | 11.16 | 19.52 | 20.98 | 93 |
| SHERBURNE | 4788.00 | 66,147 | 22,348 | 4776.28 | 4759.08 | 49,678 | 25,970 | 39 | 116 | 52 | 17.50 | 29.05 | 30.16 | 96 |
| FRESNO | 2575.00 | 92,880 | 53,060 | 2559.39 | 2569.79 | 39,844 | 70,218 | 76 | 132 | 176 | N.A. | N.A. | N.A. | N.A. |
| NELSON | 2221.60 | 78,951 | 54,614 | 2216.05 | 2215.69 | 56,997 | 55,702 | 71 | 102 | 98 | N.A. | N.A. | N.A. | N.A. |
| BIGHORN LAKE | 3640.00 | 1,070,029 | 831,066 | 3584.32 | 3613.14 | 662,957 | 823,794 | 77 | 99 | 124 | 9.92 | 11.32 | 13.83 | 82 |

**TABLE 4**
**State-Owned Reservoirs March 31, 2006**

| Reservoir | Drainage | March 31, 2006 | | | Year Ago (3/31/05) | |
|---|---|---|---|---|---|---|
| | | Contents (ac-ft) (1) | % of Avg. | % of Capacity (2) | Storage (ac-ft) | % of Avg. |
| **Missouri River Basin** | | | | | | |
| Ackley Lake | Judith River | 2,505 | 77 | 43 | 2180 | 66 |
| Bair | Musselshell | 3,093 | 70 | 44 | 3510 | 79 |
| Deadman's Basin | Musselshell | 38,713 | 79 | 54 | 19770 | 40 |
| Martinsdale | Musselshell | 9,002 | 99 | 39 | 4070 | 44 |
| Middle Creek (Hyalite)(3) | Gallatin | 7,377 | 114 | 72 | 6900 | 107 |
| Nilan | Sun River | 5,937 | 81 | 55 | 4980 | 76 |
| North Fork of Smith | Smith River | 5,813 | 95 | 72 | 7220 | 103 |
| Ruby River | Ruby River | 29,916 | 91 | 59 | 31000 | 100 |
| **Yellowstone River Basin** | | | | | | |
| Cooney (3) | Rock Creek | 20,732 | 98 | 74 | 22960 | 109 |
| Tongue River (3) | Tongue River | 47,139 | 115 | 60 | 44210 | 108 |
| **Clark Fork Basin** | | | | | | |
| East Fork Rock Creek | Rock Creek | 9,315 | 102 | 58 | 7100 | 77 |
| Nevada Creek | Blackfoot | 8,930 | 117 | 80 | 5710 | 74 |
| Painted Rocks | Bitterroot | 8,600 | 111 | 27 | 8200 | 70 |

Notes:
Information from Montana Department of Natural Resources and Conservation, State Water Projects Bureau

(1) Ac-ft is an abbreviation for acre-feet, a measure of volume. An acre-foot covers one acre of land one foot deep.
(2) 100 percent capacity indicates reservoir is full.
(3) Capacity and average storage values reflect post-rehabilitation data.

**TABLE 5**
**Palmer Drought Severity Indices (PDSI) in Montana [1]**

| District | PDSI 5/21/05 | PDSI 4/1/06 | Cumulative Precipitation Deficit (Inches) | |
|---|---|---|---|---|
| | | | 5/21/05 | 4/1/06 |
| Northwest | -1.08 | 2.08 | 1.15 | 0 |
| Southwest | -5.03 | -2.80 | 5.77 | 2.52 |
| Northcentral | -3.15 | -1.61 | 3.61 | 0.64 |
| Central | -5.03 | -2.68 | 6.64 | 2.33 |
| Southcentral | -0.95 | -0.75 | 0.45 | 0.56 |
| Northeast | -0.73 | -0.70 | 0.82 | 0 |
| Southeast | -0.44 | -0.63 | 1.12 | 0.13 |

Explanation: The Palmer Drought Severity Index describes the intensity of prolonged wet or dry periods as shown below. The figures are provisional and subject to change by CPC.

| Range | Description |
|---|---|
| +4.0 and greater | Extremely moist spell |
| +3.0 through +3.99 | Very moist spell |
| +2.0 through +2.99 | Unusually moist spell |
| +1.0 through +1.99 | Moist spell |
| +0.5 through +0.99 | Incipient moist spell |
| -0.49 through +0.49 | Normal |
| -0.5 through -0.99 | Incipient Drought |
| -1.0 through -1.99 | Mild drought |
| -2.0 through -2.99 | Moderate drought |
| -3.0 through -3.99 | Severe drought |
| -4.0 and less | Extreme drought |

Notes
(1) Palmer Drought Severity Indices provided by Climate Prediction Center, Wash. D.C

**TABLE 6**
**Montana Surface Water Supply Indices (SWSI)**

| April 1, 2006 | | | |
|---|---|---|---|
| Basin | SWSI | Basin | SWSI |
| Tobacco River | 1.2 | Missouri R. above Cnyon Ferry | 0.2 |
| Kootenai Riv. bel Libby Dam | 2.7 | Missouri R. bel. Canyon Ferry | -0.3 |
| Fisher River | 1.1 | Smith River | 1.5 |
| Yaak River | 0.9 | Sun River | -1.5 |
| North Fork Flathead River | 0.0 | Teton River | -1.6 |
| Middle Fork Flathead River | 0.0 | Birch/Dupuyer Creeks | -2.9 |
| South Fork Flathead River | 3.3 | Marias River above Tiber | -1.7 |
| Stillwater/Whitefish Rivers | 1.5 | Musselshell River | 2.3 |
| Swan River | 0.6 | Missouri above Fort Peck Res. | -1.2 |
| Flathead River at Polson | 0.4 | Missouri River below Fort Peck | -3.4 |
| Mission Valley | 1.4 | Milk River | -1.6 |
| Little Bitterroot River | 0.0 | Dearborn River near Craig | -1.3 |
| Clark Fork above Milltown | 0.0 | Yellowstone R. ab. Livingston | 1.2 |
| Blackfoot River | -1.9 | Shields River | 2.2 |
| Bitterroot River | 1.8 | Boulder River (Yellowstone) | 0.6 |
| Clark Fork bel. Bitterroot R. | 0.3 | Stillwater River | 0.9 |
| Clark Fork below Flathead R. | 0.4 | Rock/Red Lodge Creeks- | -2.6 |
| Beaverhead River | -1.4 | Clarks Fork Yellowstone River | 0.2 |
| Ruby River | 0.9 | Yellowstone above Bighorn R. | 0.9 |
| Big Hole River | 0.5 | Bighorn River | -0.3 |
| Boulder River (Jefferson) | 0.8 | Little Bighorn River | -0.1 |
| Jefferson River | 1.4 | Yellowstone bel. Bighorn River | 0.4 |
| Madison River | 0.7 | Tongue River | -1.3 |
| Gallatin River | 1.8 | Powder River | -0.5 |
| Upper Judith River | 0.6 | Saint Mary River | 0.0 |

Note: The Surface Water Supply Index (SWSI) is an indicator describing predicted surface water availability. The April 1, 2006 SWSI describes spring surface water supply conditions near the start of the 2005-growing season. The map figure at the end of this report illustrates April 1, 2006 SWSI values.

# APPENDIX

## Drought Statute

In 1991, Montana's Fifty-second Legislature passed House Bill 537, creating a state drought advisory committee and defining its responsibilities. The law states:

The Drought Advisory Committee shall submit a report to the governor describing the potential for drought in the coming year. If the potential for drought merits additional activity by the drought advisory committee, the report must also describe:

(a) Activities to be taken by the drought advisory committee for informing the public about the potential for drought;

(b) A schedule for completing activities;

(c) Geographic areas for which the creation of local drought advisory committees will be suggested to local governments and citizens; and

(d) Requests for the use of any available state resources that may be necessary to prevent or minimize drought impacts (Section 2-15-3308 MCA 1991).

**The National Integrated Drought Information System Act of 2006**



.....................................................................
(Original Signature of Member)

109TH CONGRESS
2D SESSION

# H. R. ____

To establish a National Integrated Drought Information System within the National Oceanic and Atmospheric Administration to improve drought monitoring and forecasting capabilities.

---

IN THE HOUSE OF REPRESENTATIVES

Mr. HALL (for himself and Mr. UDALL of Colorado) introduced the following bill; which was referred to the Committee on ______________________

---

# A BILL

To establish a National Integrated Drought Information System within the National Oceanic and Atmospheric Administration to improve drought monitoring and forecasting capabilities.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

**SECTION 1. SHORT TITLE.**

This Act may be cited as the "National Integrated Drought Information System Act of 2006".

**SEC. 2. DEFINITIONS.**

In this Act:

(1) DROUGHT.—The term "drought" means a deficiency in precipitation—

(A) that leads to a deficiency in surface or subsurface water supplies (including rivers, streams, wetlands, ground water, soil moisture, reservoir supplies, lake levels, and snow pack); and

(B) that causes or may cause—

(i) substantial economic or social impacts; or

(ii) substantial physical damage or injury to individuals, property, or the environment.

(2) UNDER SECRETARY.—The term "Under Secretary" means the Under Secretary of Commerce for Oceans and Atmosphere.

**SEC. 4. NIDIS PROGRAM.**

(a) IN GENERAL.—The Under Secretary, through the National Weather Service and other appropriate weather and climate programs in the National Oceanic and Atmospheric Administration, shall establish a National Integrated Drought Information System.

(b) SYSTEM FUNCTIONS.—The National Integrated Drought Information System shall—

(1) provide an effective drought early warning system that—

(A) is a comprehensive system that collects and integrates information on the key indicators of drought in order to make usable, reliable, and timely assessments of drought, including assessments of the severity of drought and drought forecasts.

(B) communicates drought forecasts, drought conditions, and drought impacts on an ongoing basis to—

(i) decisionmakers at the Federal, regional, State, tribal, and local levels of government;

(ii) the private sector; and

(iii) the public,

in order to engender better informed and more timely decisions thereby leading to reduced impacts and costs; and

(C) includes timely (where possible real-time) data, information, and products that reflect local, regional, and State differences in drought conditions; and

(2) coordinate, and integrate as practicable, Federal research in support of a drought early warning system.

(c) CONSULTATION.—The Under Secretary shall consult with relevant Federal, regional, State, tribal, and local government agencies, research institutions, and the private sector in the development of the National Integrated Drought Information System.

(d) COOPERATION FROM OTHER FEDERAL AGENCIES.—Each Federal agency shall cooperate as appropriate with the Under Secretary in carrying out this Act.

**SEC. 5. AUTHORIZATION OF APPROPRIATIONS.**

There are authorized to be appropriated to carry out this Act—

(1) $12,000,000 for fiscal year 2007;

(2) $14,000,000 for fiscal year 2008;

(3) $16,000,000 for fiscal year 2009;

(4) $16,000,000 for fiscal year 2010;

(5) $18,000,000 for fiscal year 2011; and

(6) $18,000,000 for fiscal year 2012.

April 11, 2006

The Honorable Ralph M. Hall
2405 Rayburn HOB
Washington, D.C. 20515-4304

The Honorable Mark Udall
240 Cannon HOB
Washington, D.C. 20515-0602

Dear Representative Hall and Representative Udall:

On behalf of the Western Governors' Association, we commend you for introducing H.R. 5136, "The National Integrated Drought Information System Act of 2006."

The Western Governors believe that improved drought monitoring and forecasting is fundamental to a proactive approach toward drought and water shortages. NIDIS, the program authorized by your bill, will allow policy-makers and water managers at all levels of the private and public sectors to make more informed and timely decisions about their water resources in order to mitigate or avoid the impacts from droughts. WGA strongly supports H.R. 5136, and we urge its enactment this Congress.

Over the last decade, several severe and long-term droughts have occurred in the United States. Recent severe drought conditions across the nation and particularly in the West have created life-threatening situations, as well as financial burdens for governments and individuals. The fiscal impacts of drought are significant. According to the National Oceanic Atmospheric Administration (NOAA), the federal government spends on average \$6 to 8 billion per year on drought. Additionally, since 2000 the federal government has averaged over \$1 billion annually for wildfire suppression.

In its May 2000 report to Congress, the National Drought Policy Commission recommended improved "collaboration among scientists and managers to enhance the effectiveness of observation networks, monitoring, prediction, information delivery, and applied research and to foster public understanding of and preparedness for drought."

Building on the Commission's recommendation, WGA developed in partnership with NOAA the report entitled, *Creating a Drought Early Warning System for the 21st Century: The National Integrated Drought Information System.* The report—adopted by the Governors in June 2004—concludes that "Recognition of droughts in a timely manner is dependent on our ability to monitor and forecast the diverse physical indicators of drought, as well as relevant economic, social and environmental impacts." The report calls on Congress to authorize a National Integrated Drought Information System.

Again, the Western Governors commend you for introducing H.R. 5136, "The National Integrated Drought Information System Act of 2006." We urge its enactment this Congress.

Sincerely,

Governor Janet Napolitano
WGA Chair

Governor Mike Rounds
WGA Vice Chair

Governor Bill Richardson
WGA Lead Governor for Drought

Governor Brian Schweitzer
WGA Lead Governor for Drought

**Types of Drought**

As the Montana Governor's Drought Advisory Committee continues to assess the current protracted cycle of drought, it is instructive to consider the different types of drought, as assessments vary depending upon type and duration of drought. In this regard, the National Drought Mitigation Center, located at the University of Nebraska, Lincoln, has prepared the following narrative:

## What is Drought?

(National Drought Mitigation Center: http://www.drought.unl.edu/whatis/concept.htm)

### Understanding and Defining Drought

#### The Concept of Drought

Drought is a normal, recurrent feature of climate, although many erroneously consider it a rare and random event. It occurs in virtually all climatic zones, but its characteristics vary significantly from one region to another. Drought is a temporary aberration; it differs from aridity, which is restricted to low rainfall regions and is a permanent feature of climate.

Drought is an insidious hazard of nature. Although it has scores of definitions, it originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector. Drought should be considered relative to some long-term average condition of balance between precipitation and evapotranspiration (i.e., evaporation + transpiration) in a particular area, a condition often perceived as "normal". It is also related to the timing (i.e., principal season of occurrence, delays in the start of the rainy season, occurrence of rains in relation to principal crop growth stages) and the effectiveness (i.e., rainfall intensity, number of rainfall events) of the rains. Other climatic factors such as high temperature, high wind, and low relative humidity are often associated with it in many regions of the world and can significantly aggravate its severity.

Drought should not be viewed as merely a physical phenomenon or natural event. Its impacts on society result from the interplay between a natural event (less precipitation than expected resulting from natural climatic variability) and the demand people place on water supply. Human beings often exacerbate the impact of drought. Recent droughts in both developing and developed countries and the resulting economic and environmental impacts and personal hardships have underscored the vulnerability of all societies to this "natural" hazard.

#### Conceptual Definitions of Drought

Conceptual definitions, formulated in general terms, help people understand the concept of drought. For example: Drought is a protracted period of deficient precipitation resulting in extensive damage to crops, resulting in loss of yield.

**Operational Definitions of Drought**

Operational definitions help people identify the beginning, end, and degree of severity of a drought. (An abbreviated description of operational definitions is also available.) To determine the beginning of drought, operational definitions specify the degree of departure from the average of precipitation or some other climatic variable over some time period. This is usually done by comparing the current situation to the historical average, often based on a 30-year period of record. The threshold identified as the beginning of a drought (e.g., 75 percent or less of average precipitation over a specified time period) is usually established somewhat arbitrarily, rather than on the basis of its precise relationship to specific impacts.

An operational definition for agriculture might compare daily precipitation values to transpiration rates to determine the rate of soil moisture depletion. This relationship can then be expressed in terms of drought effects on plant behavior (i.e., growth and yield) at various stages of crop development. A definition such as this one could be used in an operational assessment of drought severity and impacts by tracking meteorological variables, soil moisture, and crop conditions during the growing season, continually reevaluating the potential impact of these conditions on final yield. Operational definitions can also be used to analyze drought frequency, severity, and duration for a given historical period. Such definitions, however, require weather data on hourly, daily, monthly, or other time scales and, possibly, impact data (e.g., crop yield), depending on the nature of the definition being applied. Developing climatology of drought for a region provides a greater understanding of its characteristics and the probability of recurrence at various levels of severity. Information of this type is extremely beneficial in the development of response and mitigation strategies and preparedness plans.

**Disciplinary Perspectives on Drought:**
Meteorological, Hydrological, Agricultural and Socioeconomic

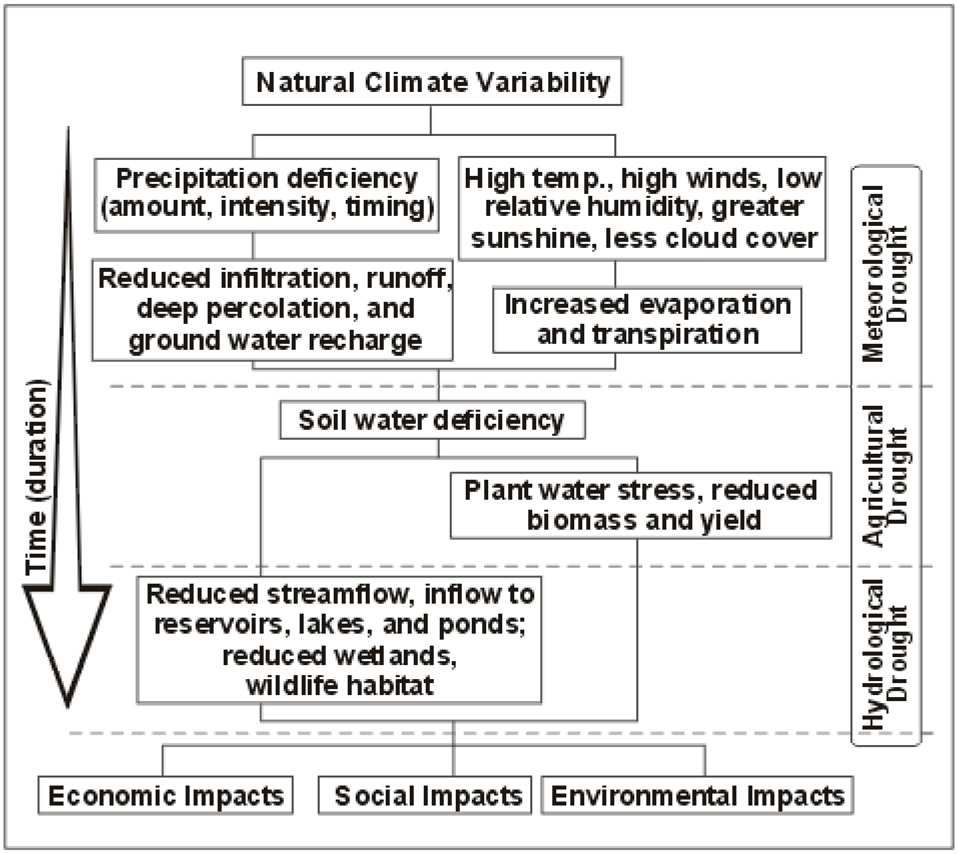
**Meteorological Drought**
Meteorological drought is defined usually on the basis of the degree of dryness, when compared to some "normal" or average amount of precipitation and the duration of the dry period. Definitions of meteorological drought must be considered as region specific since the atmospheric conditions that result in deficiencies of precipitation are highly variable from region to region. For example, some definitions of meteorological drought identify periods of drought on the basis of the number of days with precipitation less than some specified threshold. This measure is only appropriate for regions characterized by a year-round precipitation regime such as a tropical rainforest, humid subtropical climate, or humid mid-latitude climate. Other definitions may relate actual precipitation departures to average amounts on monthly, seasonal, or annual time scales.

**Agricultural Drought**
Agricultural drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapo-transpiration, soil water deficits, reduced ground water or reservoir levels, and so forth. Plant water demand depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil. A good definition of agricultural drought should be able to account for the variable susceptibility of crops during different stages of crop development, from emergence to maturity. Deficient topsoil moisture at

planting may hinder germination, leading to low plant populations and a reduction of final yield. However, if topsoil moisture is sufficient for early growth requirements, deficiencies in subsoil moisture at this early stage may not affect final yield if subsoil moisture is replenished as the growing season progresses or if rainfall meets plant water needs.

**Hydrological Drought**
Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (i.e., streamflow, reservoir and lake levels, ground water). The frequency and severity of hydrological drought is often defined on a watershed or river basin scale. Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. Hydrological droughts are usually out of phase with, or lag the occurrence of meteorological and agricultural droughts. It takes longer for precipitation deficiencies to show up in components of the hydrological system such as soil moisture, streamflow, and ground water and reservoir levels. As a result, these impacts are out of phase with impacts in other economic sectors. For example, a precipitation deficiency may result in a rapid depletion of soil moisture that is almost immediately discernible to agriculturalists, but the impact of this deficiency on reservoir levels may not affect hydroelectric power production or recreational uses for many months. Also, water in hydrologic storage systems (e.g., reservoirs, rivers) is often used for multiple and competing purposes (e.g., flood control, irrigation, recreation, navigation, hydropower, wildlife habitat), further complicating the sequence and quantification of impacts. Competition for water in these storage systems escalates during drought and conflicts between water users increase significantly.

**Socioeconomic Drought**
Socioeconomic Drought reflects the societal impacts of drought on existing economic and social systems and communities. Hydrological and Socioeconomic drought are related in that they tend to demonstrate the long-term effects of drought. And although they are the last group of impacts to take hold following the onset of drought, they are the longest lasting of the four types of drought and can linger for years following the beginning of recovery from the meteorological and agricultural, or short-term aspects of drought. Impacts include strain on the solvency of businesses in the agricultural service sector, such as trucks, heavy equipment, feeds and fertilizer, custom harvesting, and fuel as well as the small businesses that support agricultural communities. Debt also affects the ability of concerns to endure and some will fail never to be re-established. Human impacts can include depression, anxiety, substance abuse, domestic abuse, and gambling.



Natural Climate Variability
Precipitation deficiency (amount, intensity, timing)
High temp., high winds, low relative humidity, greater sunshine, less cloud cover
Reduced infiltration, runoff, deep percolation, and ground water recharge
Increased evaporation and transpiration
Soil water deficiency
Plant water stress, reduced biomass and yield
Reduced streamflow, inflow to reservoirs, lakes, and ponds; reduced wetlands, wildlife habitat
Economic Impacts
Social Impacts
Environmental Impacts
Time (duration)
Meteorological Drought
Agricultural Drought
Hydrological Drought